International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 03, 2020
ISSN: 1475-7192

The ratio of the contribution of some biomechanical variables and indicators to the achievement of the effectiveness of the high jump with (Fosbury Flop) as an indicator to determine the efficiency of the starting variables

[1]Dr. Atheer Khaleel Ibrahim Alsudani

Abstract

The aim of the research is to identify the value of some of the variables represented by (the angle of inclination of the body at the moment of rise, the height of the center of mass of the body, the angle and velocity of departure, the highest strength of the moment of rise, the time of momentary thrust, the moment of rise, the angular momentum of the trunk, the angular momentum of the thigh of the weighted man The angular momentum of the leg of the weighted leg, the angular momentum of the leading arm), the biomechanical indicators of movement flow, the momentary ability to rise, the kinetic energy of the trunk, and the identification of the percentage of contribution to the achievement, as the research problem embodied in finding a contribution rate for some variables and biomechanical indicators related to the main section stage) Standing and advancement) as a criterion for evaluating the effectiveness of the launch to the achievement of the effectiveness of the high jump in the (Fosbury Flop) simultaneously in order to research the parts of the skill of performance and to reach the accuracy of technical performance that serves sports achievement and work to develop it because it is related to the correct biomechanical conditions associated with the performance of the event. Descriptive approach, correlational relations, the sample consisted of 12 hopers who accounted for (75%) from the research community. (CASIO) type number (3) with high speed (120 images / second), and the values of the search variables were extracted through imaging using the kinematic analysis program (Kinovea 8.25), and the data results were presented, analyzed and discussed to extract the value of the correlations for the variables and achievement rates. The following conclusions were reached (the ratio of the contribution of the variables, velocity and starting angle, the highest strength of the moment of rise, as for the biomechanical indicators, the angular momentum of the weighted leg of the leg, the movement flow, the momentary ability to rise), and the researcher recommended (the importance of strengthening and supporting the capabilities of trainers by including them in Various workshops and work sessions to identify the importance of applying physical and mathematical laws and kinematic analysis, he conducted similar studies and supported them with biomechanical variables and indicators of the body over the crossbar in proportion to the anthometric measurements, the necessity of conducting similar researches, a few physical exercises - skilled with perception - kinesthetic).

Keywords: biomechanics, biomechanical variables and indicators, high jump

Introduction:

[1] Ministry of Education - General Directorate of Education for Baghdad Governorate Al-Karkh / Third
atheer.khaleel@yahoo.com

The rapid development of records in athletics activities is only a result of the optimal investment of science and modern research technical means, where the effectiveness of the high jump is one of the activities that require high-level technical performance and the ability to interconnect between physical abilities and mastering the technical aspects associated with mechanical conditions to achieve a stage Hopper has a qualitative value that qualifies the jumper to compete and reach sports achievement.

Therefore, it is our duty as researchers to search for the causes of movement that explain mathematical skills, study the mechanics of movement of the parts of the body, explain the strengths to claim them, and find ways to address the weaknesses.

Hence the researcher's idea of the percentage of the contribution of some biomechanical variables and indicators to the achievement of the effectiveness of the high jump with (Fosbury Flop) as an indicator to determine the efficiency of the starting variables, to improve the level of the movement performance of the activity players, so the researcher believes that the study of movement sections is an important aspect in the interpretation of cases that coincide with the athlete during the performance Which are related to the physical laws and kinetic indicators that are represented by the momentum and kinetic energy of the parts of the body and the momentum of the exerted forces, according to the work performed that represents the momentary capacity of the general performance that is usually related to the kinematic transmission between the lower and upper extremities to find the most appropriate movement paths according to the kinetic goal of performance, which is to obtain The farthest possible distance after throwing, a problem identified in answering the following questions:

1. What are the values of (the angle of inclination of the body, the moment of rise, the height of the center of mass of the body, the angle and velocity of the launch, the highest strength of the moment of rise, the momentary momentum of the moment of rise, the angular momentum of the torso, the angular momentum of the thigh of the weighted leg, the angular momentum of the leg of the weighted leg, the angular momentum of the arm Leader), as for the indicators (movement, momentary ability to rise, kinetic energy of the trunk).

2. What is the relationship between the values of (the angle of inclination of the body, the moment of rise, the height of the center of mass of the body, the angle and the velocity of the launch, the highest strength of the moment of rise, the momentary momentum of the moment of rise, the angular momentum of the trunk, the angular momentum of the thigh of the weighted leg, the angular momentum of the leg of the weighted leg, the momentum The leading arm angular), as for the indicators (kinetic flow, momentary ability to rise, kinetic energy of the trunk) of achievement.

3. What is the ratio of the contribution of the values (angle of inclination of the body, moment of rise, height of the center of mass of body, angle and velocity of departure, highest strength, moment of rise, momentary momentum of moment of rise, angular momentum of the trunk, angular momentum of the thigh of the weighted leg, angular momentum of the leg of the weighted leg, momentum The angle of the leading arm), (movement flow, the momentary ability to rise, the kinetic energy of the trunk) with achievement, where the aim of the research is to the following:

To know the values of the variables (the angle of inclination of the body, the moment of rise, the height of the center of mass of the body, the angle and velocity of the launch, the highest strength of the moment of rise, the momentary momentum of the moment of rise, the angular momentum of the trunk, the angular momentum of the thigh of the weighted leg, the angular momentum of the leg of the weighted leg, the angular momentum of the leg For the leading arm), as for the indicators (movement flow, momentary ability to rise, kinetic energy of the trunk).

Identify a relationship between the values of the variables (the angle of inclination of the body, the moment of rise, the height of the center of mass of the body, the angle and velocity of departure, the highest strength of the moment of rise, the momentary momentum of the moment of rise, the angular momentum of the trunk, the angular momentum of the thigh of the weighted leg, the angular momentum of the leg of the weighted leg, The angular momentum of the leading arm), as for the indicators (kinetic flow, momentary ability to rise, kinetic energy of the trunk) of achievement.

To know the ratio of the contribution of the values of (the angle of inclination of the body, the moment of rise, the height of the center of mass of the body, the angle and velocity of the launch, the highest strength of the moment of rise, the momentary momentum of the moment of rise, the angular momentum of the trunk, the angular momentum of the thigh of the weighted leg, the angular momentum of the leg of the weighted leg, the momentum The leading arm angular), as for the indicators (kinetic flow, momentary ability to rise, kinetic energy of the trunk) of achievement.

Method and tools: The descriptive approach was used in the method of correlational relations, and the research sample consisted of (12) athletes for the high jump effectiveness for the youth group participating in the Iraq Clubs and Institutions Championships for Athletics 2019, whose percentage was (75%) of the research community of (16) hopers after they (4) and two finalists were excluded due to their counting of qualification from the qualifiers, and Table (1) shows descriptive statistics:

Table (1)

It shows the homogeneity and specifications of the research sample

variables	Mean	Median	Std. Deviation	Std. Error of Mean	Skewness	Coefficient of variation%
Length	1.84	1.84	0.055	0.016	0.411	2.97
Training age	3.58	4.00	0.796	0.238	0.633	21.19
Weight	66.00	65.50	3.275	0.945	0.782	4.96
Trunk length	0.53	0.54	0.023	0.007	-0.232	4.26
Humerus length	0.31	0.32	0.014	0.004	0.546	4.37
Forearm length	0.27	0.27	0.019	0.006	0.076	7.26
Thigh length	0.50	0.50	0.019	0.005	-0.611	3.77
Leg length	0.45	0.45	0.015	0.004	0.881	3.35
Achievement	1.77	1.76	0.073	0.021	0.381	4.12

Table No. (1) shows that the values of the torsion coefficient were confined to (-0.633 _0.881), and the researcher used the coefficient of variation in order to identify the factor of the intruder on the research variables if any. For sample homogeneity (1).

Determining the research variables: The researcher has identified the biomechanical variables and indicators, which are as follows:

The body's tilt at the moment of advancement (degree): the angle between the line connecting from the mid-foot point to the point of the body's center of mass with the vertical descending moment of advancement.

Maximum height of the center of body mass (mkg) (cm): the distance from the vertical distance confined between the point of the center of mass of the body descending on the horizontal line parallel to the ground, the moment of the last contact of the foot with the ground in the advancement.

Departure angle (cm): It is the angle between the hip path line (the center of body mass), with the point of the imaginary line passing through the hip at the moment of the last contact with the ground.

Cruising velocity (sec.): Measured by measuring the distance traveled to the point of the center of mass of the object from the last contact with the Earth, according to its time, and that x = (distance time).

Angular velocity: It is measured by extracting through the angle of transmission latitude.

Values for the relative weight of the body part	Body parts	ت
0.7	head	1.
0.03	Humerus	2.
0.02	Forearm	3.
0.01	hand	4.
0.43	trunk	5.

the angular momentum of the part: is extracted by multiplying the moment of inertia of a block by its angular velocity.

Measuring the mass of the part relative to the body mass: body mass x the relative weight of part (2) as shown in Table (2).

0.12	Thigh	6.
0.05	leg	7.
0.02	foot	8.

|(1)Wadih Yassin Muhammad and Hassan Muhammad Abd; Statistical applications and computer uses in physical education research. B.T (Dar Al-Kutub for Printing and Publishing, Mosul, 1999) pp. 168-169.

(2) Muhammad Ibrahim Shehata and Muhammad Jaber Bereka`; Anthropometric Handbook and Dynamic Performance Tests, B.T (Alexandria, Knowledge Foundation, 1999), p. 31

The angular kinetic energy of the trunk (joules): = 0.5 mass of the part x Nq x (angular velocity) 2 extracted.

instantaneous power (joules / s): it was extracted through force = mass x velocity ÷ time, as for velocity through: transmission distance (mKG) at maximum dependence to the maximum in the thrust stage ÷ thrust time: where the power is = Work (force x distance ÷ time).

Pushing time Standing moment (seconds): The time taken by the jumper from the moment of starting the push (tide) to the last moment of cutting off the foot's contact with the ground, measured from the force measuring device (Dyna foot).

The highest strength at the moment of rising (driving man) (Newton): measured by a Dyna foot force measuring device

momentum change (kinematic flow) (kg m / s): the difference between

Final momentum (momentum) = mass x velocity, and initial momentum: mass x velocity -

The reconnaissance experiment was conducted on Wednesday, 9/2/2019, on a sample of (3), and it was evident, to identify the location of the cameras, and the efficiency of the devices and tools used, where the main (high jump effectiveness test) was conducted (1).

On a sample of (12) hoping on Thursday 09/19/2019, cameras were installed (1) at a distance (7 m) from the parallel line of the beam holder and at a height of (1.45 cm), the focus of the camera lens from the ground level, and the cameras were installed (2) At a distance of (6 m) on the side opposite the path of the hopper at the moment of the last step and at a height of (1.30 cm) the focus of the camera lens from the ground level, and the cameras were installed (3) at a distance (8 m) from the center of the beam at an angle of 45o and a height of (1.40) (Cm) the focus of the imaging lens at ground level, using (a Casio camera, speed 120_1000 image / sec), and a force measuring device (Dyna_foot) to measure the maximum force and its time. For data processors to find descriptive and inferential statistics, and as shown in Table (3), this explains.

Table (3)

Demonstrates the value of descriptive statistics of biomechanical variables and indicators of high jump effectiveness

variable			Mean	Median	Std. Deviation	Std. Error of Mean	Skewness
Biomechanical variants	A1	The tilt of the body when rising	23.000	23.500	4.000	1.155	-0.010
	A2	High advancing body mass center	1.160	1.150	0.039	0.011	0.330
	A3	Starting angle	44.583	45.000	3.554	1.026	0.077
	A4	speed starting	4.348	4.315	0.384	0.111	-0.055
	A5	The highest strength is the moment of advancement	1831.167	1835	205.880	59.433	0.052

	A6	Instant push time the moment of rise	0.218	0.211	0.022	0.006	0.848
	B1	The angular momentum of the trunk	1767.465	1792.794	235.259	67.913	0.077

	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	B7
lation		-0.082	-0.371	-0.065	-0.469	0.158	0.256	-0.539	-0.657	-0.115	0.147	-0.097	0.178
		0.799	0.235	0.842	0.124	0.623	0.421	0.070	0.020	0.721	0.649	0.764	0.579
lation			0.384	0.024	0.461	-0.685	0.829	0.763	0.728	0.727	-0.128	0.671	0.839
			0.217	0.941	0.131	0.014	0.001	0.004	0.007	0.007	0.691	0.017	0.001
lation				0.610	0.877	-0.634	0.317	0.645	0.695	0.329	-0.539	0.788	0.429
				0.035	0.000	0.027	0.315	0.023	0.012	0.297	0.071	0.002	0.164
lation					0.659	-0.239	0.042	0.146	0.223	-0.197	-0.235	0.638	0.101
					0.020	0.454	0.897	0.651	0.487	0.540	0.462	0.026	0.754
lation						-0.763	0.353	0.731	0.722	0.188	-0.177	0.866	0.411
						0.004	0.260	0.007	0.008	0.558	0.582	0.000	0.184
lation							-0.758	-0.810	-0.578	-0.276	-0.064	-0.842	-0.778
							0.004	0.001	0.049	0.385	0.843	0.001	0.003
lation								0.611	0.395	0.542	-0.015	0.718	0.980
								0.035	0.203	0.069	0.962	0.009	0.000
lation									0.855	0.553	-0.088	0.712	.661
									0.000	0.062	0.787	0.009	0.019

Biomechanical indicators	B2	The angular momentum of a man-weighted thigh	1348.795	1367.613	219.255	63.294	-0.318
	B3	The angular momentum of the leg weighted man	383.268	395.231	67.174	19.391	0.288
	B4	The angular momentum of the leading arm	1954.636	1825.301	315.563	91.095	1.016
	B5	Kinetic flow	-92.793	-97.965	32.606	9.413	-0.414
	B6	Instantaneous ability to rise	1329.628	1364.141	206.783	59.693	0.099
	B7	Kinetic energy of the trunk	1649.468	1644.363	161.272	46.555	0.224
	C	Achievement	1.771	1.760	0.073	0.021	0.381

Table No. (3) shows the values of the torsion coefficient that were confined between (- 0.010 / 1.016) within the normal curve (± 2), and the values of the correlational relationships between the study variables were extracted through Pearson's law, which achieves the second goal of the research, as shown in the table No. (4) shows this, as Table No. (5) shows the contribution ratios, the error rate, the variance value of the variables and the biomechanical indicators of achievement in the effectiveness of the high jump, which achieves the essential goal of the research

Table (4)

It shows the values of the interrelationships between the variables and the biomechanical indicators studied

lation										0.637	-0.431	0.629	0.490
										0.026	0.162	0.028	0.106
lation											-0.358	0.342	0.561
											0.254	0.276	0.058
lation												-0.186	-0.171
												0.562	0.595
lation													0.755
													0.004
lation													

Table No. (5)

Shows correlation values, contribution percentage, variance values, and the level of significance for variables and biomechanical indicators of achievement

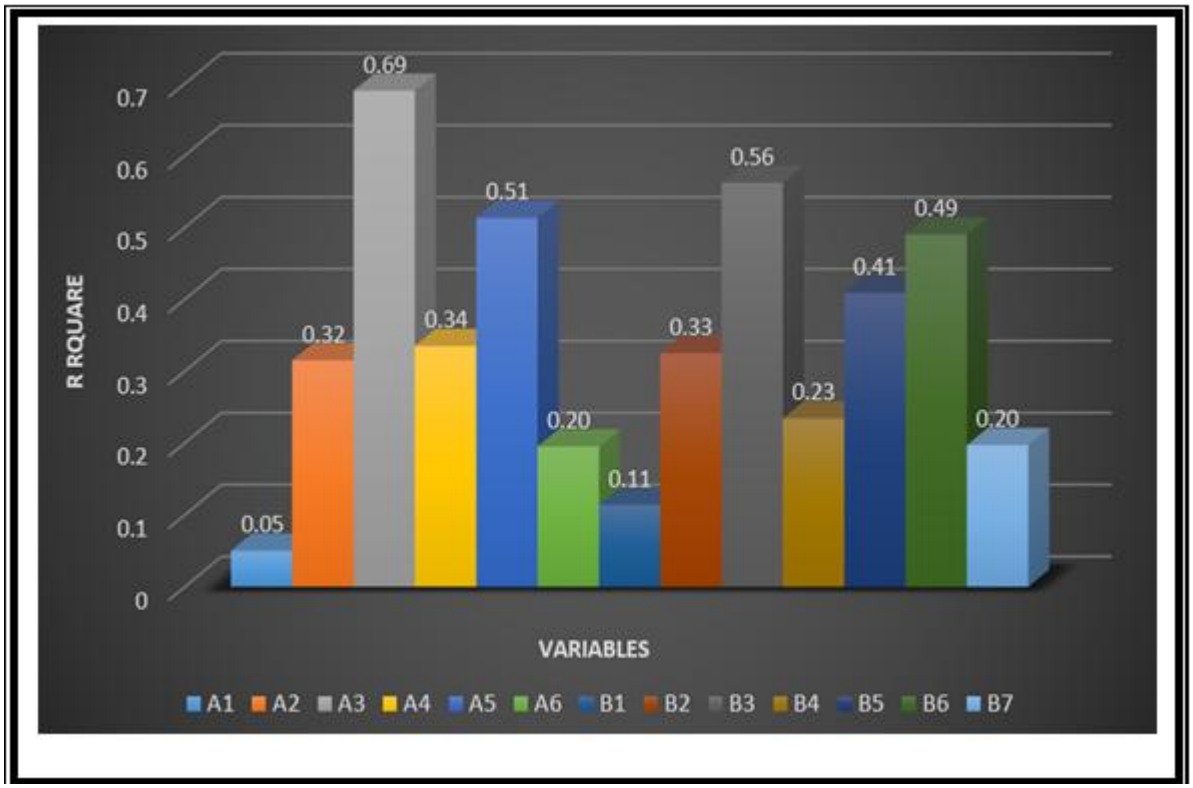
Model	symbol	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
tilt of the body when rising	**A1**	0.224	0.050	0.045 -	0.075	0.528	0.484
High center of body mass	**A2**	0.561	0.315	0.246	0.604	4.589	0.058
Starting angle	**A3**	0.824	0.690	0.648	0.043	21.225	0.001
Speed starting	**A4**	0.579	0.335	0.269	0.025	5.040	0.049
The highest strength is the moment of rise	**A5**	0.716	0.513	0.465	0.053	10.543	0.009
Momentous push time, moment of rise	**A6**	0.441	0.195	0.114	0.688	2.416	0.151
The angular momentum of the trunk	**B1**	0.338	0.114	0.026	0.702	1.290	0.283
The angular momentum of a man-weighted thigh	**B2**	0.570	0.325	0.258	0.603	4.819	0.053
The angular momentum of the leg weighted man	**B3**	0.749	0.562	0.518	0.501	12.817	0.005
The angular momentum of the leading arm	**B4**	0.484	0.234	0.158	0.607	0.060	0.11
Kinetic flow	**B5**	0.640	0.409	0.360	0.059	6.928	0.025

Instantaneous ability to rise	**B6**	0.700	0.490	0.439	0.055	9.596	0.011
Kinetic energy of the trunk	**B7**	0.444	0.197	0.117	0.069	2.457	0.148

Significant at error ratio ≤ (0.05)

Figure No. (1)

It shows the values of the contribution percentage for the variables and biomechanical indicators of achievement for the effectiveness of the high jump



Presentation and discussion of results:

The correlation value for the angle of the body's inclination at the moment of rise was (0.224), and by the contribution rate (5%). As for the standard error of the estimation in the contribution rate, it reached (0.075), and the variance value in achievement was (0.528), while the value of (0.484) Sig was under The level of significance is (0.05), which is a non-significant relationship and is not statistically significant, so the researcher attributes this non-statistically significant relationship due to the guiding weakness of the high vigor to (perceptual-kinesthetic) with the position of the body, especially about that, the researcher finds that the angle of deviation of the advancing foot of the imaginary line descending to the bar Effective and directive to obtain the ideal angle of the body's inclination while standing up, the high precision of perceptual perceptions allows the implementation of negative and positive movements, which enables the athlete to direct and correct movement during performance (1).

The correlation value was the height of the body mass center (0.561), with a contribution rate (31%), and the standard error rate for the estimation in the contribution rate was (0.604), the variance value in achievement (4.589), while the value (0.058) Sig was below the level Significance (0.05), which is a non-significant and non-statistically significant relationship, so the researcher attributes this relationship to the moment of advancing the drive to overcome the Earth's gravity and to the determination of the inertia of the body as a whole and its parts in order to try to keep the body in the state it is in the restrictive part of the movement and exert a force that is directly proportional to The mass, despite its

lack of significance, but we find that the percentage of the contribution to the achievement is of effective value, and the researcher justifies that due to the kinetic orientation of the skillful performance of the effectiveness of the stage of the jump of the sample. The morale of the next two variables is the angle and velocity of launch, as the movement of the flying object depends on the determinants of projectiles, which are determined by the angle and speed of launch and the relative height of the starting point i.e. the center of mass of the body (2).

The correlation value for the starting angle was (0.824), with a contribution rate (69%), and the standard error of the estimation in the contribution percentage was (0.043), and the variance value in achievement was (21.225), while the value of (0.001) Sig was below the level of significance (0.05), which is a moral and `statistically significant relationship, so the researcher attributes this significance to the merging of the result of the horizontal and vertical velocity at (the preparatory position) and the advancement of the final section of the main section of the movement that made the body take the appropriate shape in line with the physical measurements of the players by obtaining the closest angle For optimal effectiveness requirements.

The correlation value for the starting velocity was (0.579), with a contribution rate (33%), and the standard error of the estimation in the contribution rate was (0.025), and the variance value of achievement was (5.040), while the value of (0.049) Sig was below the level of significance (0.05), which is a moral and `statistically significant relationship. The body's flight distance will increase, which is confirmed by the researcher by the exaggerated missing distance between the hip point and the beam.

The correlation value reached the highest strength exerted at the moment of advancement (0.716), with a contribution rate (51%). As for the standard error of the estimation in the contribution rate, it reached (0.053) and the variance value in achievement (10.540), while the value of (0.009) Sig was below the level of Significance (0.05), which is a significant and statistically significant relationship, so the researcher attributes this to the significant correlation of the explosive force and the distinctive force with the speed exerted on the parts of the body and the ability to complete the work versus the performance time in general through a change in the size of the body during the change of performance angles by reducing its radii in conjunction with rotation About the longitudinal stage of the rise, it is only supportive of the variable speed of departure and the momentary ability to rise, as there is a large correlation between the elements of speed and strength, so the muscle or muscle group cannot through contraction quickly if it does not have sufficient strength for this performance (1).

The value of the correlation time of payment at the moment of rise was (0.441), with a contribution rate (19%), and the standard error rate of the estimation in the contribution rate was (0.688), and the value of variance in achievement was (2.416), while the value of (0.151) Sig was below the level Significance (0.05), which is a moral relationship and has a statistical significance. The researcher attributes the morale of the relationship and the percentage of its contribution to the perception of the kinesthetic force exerted by the research sample, which is directly related to the good speed of the research sample, especially for that reliance on the last two steps of approach. Speed in the sports field is one of the basic physical characteristics that are seen as an indicator of the extent of compatibility of muscle responses with the necessary neurological responses to timing and motor range for the transition and recovery stage, as this requires the efficiency of the neuromuscular systems (1).

The correlation value of the trunk's angular momentum was (0.338), with a contribution rate (11%), and the standard error rate of the estimation in the contribution percentage was (0.702), and the variance value in achievement was (1.290), while the value of (0.238) Sig was below the level of significance (0.05) It is a significant and non-statistically significant relationship, so the researcher attributes this non-significant relationship due to the failure in the coordination of the exerted force and the velocity of the part in the angular work that requires a longer time in order to achieve the required speed that gives it angular momentum to overcome the inertia, so it requires a review of the exercises The simultaneous force and speed, considering that the trunk is the largest mass in the body and the first mass that begins the movement in the activities of the jump and jumping, where the skillful performance is affected by the range of motion of the joints participating in it, whether in terms of performance effectiveness or in terms of the extent to which the jumper can be exposed to other challenges such as approaching a device beam Jumping or moving away, especially from that, hindered the coordination of the transfer of forces that are related to the effect of the range of motion, either positively or negatively, that is, increase or decrease (2).

The value of the angular momentum of the thigh (weighted leg) was (0.570), with a contribution rate (32%), and the standard error of the estimation in the contribution rate was (0.603), and the variance value in achievement was (4.819), while the value was (0.053) Sig is below the level of significance (0.05), which is a non-significant and non-statistically significant relationship, so the researcher attributes this relationship despite its insignificance due to the loss of

coherence of performance of the research sample in transferring forces with the leg and trunk variable in terms of the principle of eccentric contraction followed by muscle contraction of the largest value of the joint angle with a central contraction which It is related to overcoming the mass of the part and the body from the moment of preparation to the moment of push and according to the effectiveness requirements to overcome the Earth's gravity and the general weakness of the research sample in the kinematic perception of the temporal and spatial body parts, especially in proportion to the individual difference in the physical measurements of the sample individuals.

The value of the angular momentum of the leg (weighted leg) was (0.749), with a contribution rate (56%), and the standard error of the estimation in the contribution percentage was (0.501), and the variance value in achievement was (12.817), while the value was (0.005) Sig is below the level of significance (0.05), which is a statistically significant relationship, and the researcher attributes this strong relationship to the consistency of the two elements of physical capabilities (strength and velocity), the force characterized by velocity of the leg part and the range of motion of this joint according to the principle of mass in the transfer of momentum and taking the same movement path for these parts.

The value of the correlation of the angular momentum of the (lead) arm was (0.484), with a contribution rate (23%), and the standard error of the estimation in the contribution rate was (0.607), and the variance value in achievement was (0.060), while the value of (0.110) Sig Below the level of significance (0.05), which is a non-significant and not statistically significant relationship, the researcher attributes this non-significant relationship to the inability of the research sample individuals to maintain the acquired velocity that they possess, which is represented by the linear and angular momentum in terms of momentum = mass x velocity that is related to the achievement of sound performance angles And a match between the strengths and the axis according to the principle of integration of absolute angles in the final section of the rebirth.

The value of the kinetic flow correlation reached (0.640), with a contribution rate (40%), and the standard error rate of the estimation in the contribution rate was (0.059), and the value of variance in achievement (6.928), while the value of (0.025) Sig was below the level of significance (0.05), which is a moral and `statistically significant relationship, so the researcher attributes this relationship to the optimal distribution of the muscle forces exerted during the time of the motor performance in the jump stage represented by the preparatory and main part, which supports the morale of the variable velocity of release, the force exerted at the moment of advancement, and the momentary ability to rise, meaning there is a consensus With a simple representation between the different parts of the body and a mechanical movement succession, with the possibility of the young sample.

The value of the correlation of the instantaneous ability to rise was (0.700), with a contribution rate (40%), and the standard error of the estimation in the contribution rate was (0.055), and the variance value of achievement (9.596), while the value of (0.011) Sig was below the level of significance. (0.05) It is a moral relationship and it has a statistical significance. The researcher attributes this significant relationship to the greater the momentum of the foot on the ground, the greater the opposing momentum, which is confirmed by Hussein Muradin and Iyad Abdel Rahman that utilizing the ocean to enhance the reaction greatly in The sports field. The high jump jumper uses the ground to enhance the central contraction reflexes of the working muscles (1).

The value of the correlation index of the kinetic energy of the trunk was (0.444), with a contribution rate (19%), and the standard error of the estimation in the contribution rate was (0.069), and the variance value in achievement (2.457), while the value of (0.148) Sig was below the level Significance (0.05), which is a moral relationship and has a statistical significance. The researcher attributes this non-statistically significant relationship because the force element overcomes the velocity component, and this is what Kamal Abdel Hamid Ismail and Muhammad Subhi Hassanein assert when trying the mathematician from the efficiency of his ability that is related to the card The mobility of the part or the general must be taken care of with strength and speed together so that the increase of one does not come at the expense of the other, as it is considered to be the ability to move the motor at the maximum (2)

As for the conclusions, the ratio of the contribution of the variables was velocity and starting angle, the highest strength of the moment of rise, as for the biomechanical indicators, the angular momentum of the weighted leg of the leg, the movement flow, the momentary ability to rise. Physical and mathematical laws and kinematic analysis, he conducted similar studies and supported them with the biomechanical variables and indicators of the body over the crossbar in proportion to the anthropometric measurements, the necessity of conducting similar researches, a few physical exercises-skill with perception and kinesthetic.

References

Wadih Yassin Muhammad and Hassan Muhammad Abed; Statistical applications and computer uses in physical education research. B.T (Dar Al-Kutub for Printing and Publishing, Mosul, 1999).

Muhammad Ibrahim Shehata and Muhammad Jaber Bereka`; Anthropometric Handbook and Kinetic Performance Tests, B.T (Alexandria, Knowledge Foundation, 1999).

Biswissi Ahmed; Track races and field competitions Teaching, Technic, Training, 1st Edition (Dar Al Fikr Al Arabi, Nasr City, 1997), p. 427.

Nahida Anwar Al-Sabbagh; The dynamic characteristics of some types of perception, muscular and musculoskeletal perception among middle school students (13-16) (Journal of the Third Scientific Conference of Physical Education Studies and Research, Heloun University, 1982).

Sarih Abdul Karim Al-Fadhli and Wahbi Alwan Al-Bayati; Mathematical Biomechanics, (Baghdad, Al-Ghadeer Press, 2012).

Abdullah Hussein Al-Lami; Scientific Foundations of Sports Training, B.T (Al-Taif for Printing, 2004), p. 65.

Mustafa Adnan Abboud; The effect of an experimental program using assistive means in developing some physical and biochemical variables and achieving the long jump in the Specialized School in Najaf, a master's thesis, (College of Physical Education and Sports Sciences, Al-Muthanna, 2016).

Talha Husam al-Din; Biomechanics, B. T (Egypt, Arab Thought House, 1993).

Hussein Mardan Omar, Iyad Abdel Rahman: Biomechanics in Sports Movements, 1st Edition (Najaf Al Ashraf Press, 2011).

Kamal Abdel Hamid Ismail and Muhammad Subhi Hassanein; Foundations of Sports Training, B. T (year 1997).